

WHAT IS CLAIMED IS:

- Sub A-17
- 5 1. A golf club comprising:
a head of a metal having a face ; and
a flexural range, defined in said face, where the quantity of flexure in a direction perpendicular to said face is at least 45 % and not more than 95 % of the maximum quantity of vertical flexure of said face, wherein said flexural range is arranged according to a hitting point distribution range of a player in said face.
2. The golf club according to claim 1, wherein the quantity of flexure in said flexural range in the direction perpendicular to said face is at least 70 % and not more than 95 % of said maximum quantity of vertical flexure.
3. The golf club according to claim 1, wherein the quantity of flexure in said flexural range in the direction perpendicular to said face is at least 90 % and not more than 95 % of said maximum quantity of vertical flexure.
4. The golf club according to claim 1, wherein a sweet spot is located within said hitting point distribution range, and said flexural range is a partial region within said hitting point distribution range located around said sweet spot.
5. The golf club according to claim 1, wherein said flexural range is matched with said hitting point distribution range.
6. The golf club according to claim 1, wherein said flexural range has an elliptic shape, and inclination of a major axis of said flexural range is in the range of 0° to 40° with respect to the ground.

7. The golf club according to claim 6, wherein said major axis extends toward an upper portion of a toe of said head.

8. The golf club according to claim 6, wherein the aspect ratio of said flexural range is 1 to 4.

9. The golf club according to claim 6, wherein the center of said flexural range is present within 0 to 5 mm from a sweet spot.

10. The golf club according to claim 1, wherein said flexural range has a quadrilateral shape.

11. The golf club according to claim 1, wherein said flexural range has a polygonal shape.

12. The golf club according to claim 1, wherein the area of said flexural range is 150 to 1500 mm².

13. The golf club according to claim 1, wherein said flexural range has a substantially uniform thickness, and the thickness of said face is gradually reduced from the outer periphery of said flexural range toward the periphery of said face.

5 14. The golf club according to claim 1, wherein the thickness of said flexural range is largest at the central portion and gradually reduced from the central portion toward the periphery of said flexural range while the ratio of reduction of the thickness of said face is increased from the outer periphery of said flexural range toward the periphery of said face beyond the periphery of said flexural range.

15. The golf club according to claim 1, wherein the ratio of reduction of the thickness of said face is reduced as the distance between the center of said flexural range and the outer periphery of said face is

increased.

16. The golf club according to claim 1, wherein the ratio of reduction of the thickness of said face is reduced as the distance between the center of said flexural range and the outer periphery of said face through the outer periphery of said flexural range is increased.

5 17. The golf club according to claim 1, wherein the ratio of reduction of the thickness of said flexural range is reduced as the distance between the center of said flexural range and the outer periphery of said flexural range is increased and the ratio of reduction of the thickness of said face is reduced as the distance between the outer periphery of said flexural range and the outer periphery of said face is increased.

18. The golf club according to claim 1, wherein the region between the outer periphery of said flexural range and the outer periphery of said face is divided into a plurality of peripheral regions,
5 the thickness of said flexural range is larger than the thicknesses of said peripheral regions, and

10 the thickness of said peripheral region having a relatively long distance between the outer periphery of said flexural range and the outer periphery of said face is larger than the thickness of said peripheral region having a relatively short distance between the outer periphery of said flexural range and the outer periphery of said face.

19. The golf club according to claim 18, wherein a portion of said face having the maximum height from a sole is located on the side of a toe, and

5 the thickness of said peripheral region located on the side of said toe is larger than the thickness of said peripheral region located on the side of a heel.

20. The golf club according to claim 18, wherein a portion of said

face having the maximum height from a sole is located on the side of a heel, and

5 the thickness of said peripheral region located on the side of said heel is larger than the thickness of said peripheral region located on the side of a toe.

21. The golf club according to claim 18, wherein said peripheral regions include first and second peripheral regions, and

said first and second peripheral regions are arranged on and under said flexural range respectively.

22. The golf club according to claim 18, wherein said peripheral regions include first and second peripheral regions,

said flexural range is arranged in the vicinity of a sole, and

5 said first and second peripheral regions are arranged on the side of a toe and on the side of a heel respectively.

23. The golf club according to claim 18, wherein said peripheral regions include first, second and third peripheral regions,

said flexural range extends up to a portion close to a sole, and

5 said first, second and third peripheral regions are arranged side by side on a toe from the side of a heel.

24. The golf club according to claim 18, wherein said peripheral regions include first, second, third and fourth peripheral regions, and

said first, second, third and fourth peripheral regions are arranged to surround said flexural range.

25. The golf club according to claim 1, wherein the region between the outer periphery of said flexural range and the outer periphery of said face is divided into a plurality of peripheral regions,

5 the thickness of said flexural range is larger than the thicknesses of said peripheral regions, and

the thickness of said peripheral region located on the side of a sole is larger than the thickness of said peripheral region located on the side of a crown.

26. The golf club according to claim 25, wherein a portion of said face having the maximum height from said sole is located on the side of a toe, and

5 the thickness of said peripheral region located on the side of said toe is larger than the thickness of said peripheral region located on the side of a heel.

27. The golf club according to claim 25, wherein a portion of said face having the maximum height from said sole is located on the side of a heel, and

5 the thickness of said peripheral region located on the side of said heel is larger than the thickness of said peripheral region located on the side of a toe.

28. The golf club according to claim 25, wherein said peripheral regions include first, second, third and fourth regions,

said first and fourth peripheral regions are located on the side of said sole,

5 said second and third peripheral regions are located on the side of said crown,

10 the length of said first peripheral region between the outer periphery of said flexural range and the outer periphery of said face is larger than the length of said fourth peripheral region between the outer periphery of said flexural range and the outer periphery of said face,

the thickness of said first peripheral region is larger than the thickness of said fourth peripheral region,

15 the length of said third peripheral region between the outer periphery of said flexural range and the outer periphery of said face is larger than the length of said second peripheral region between the outer

periphery of said flexural range and the outer periphery of said face, and the thickness of said third peripheral region is larger than the thickness of said second peripheral region.

29. The golf club according to claim 18, wherein tapered parts are formed on the boundary between said flexural range and said peripheral regions and the boundary between said peripheral regions in a width of at least 3 mm and not more than 5 mm.

30. The golf club according to claim 18, including a first tapered part having a thickness reduced toward the outer periphery of said face on the boundary between said flexural range and said peripheral regions, and including a second tapered part having a thickness reduced toward the outer periphery of said face around said peripheral regions.

31. The golf club according to claim 30, wherein the thickness of said flexural range is reduced from the central portion of said flexural range toward the outer periphery of said flexural range.

32. The golf club according to claim 1, wherein the average thickness of a first portion located closer to said face in at least either a crown or a sole of said head is smaller than the average thickness of a second portion located closer to a back part of said head .

33. The golf club according to claim 32, wherein the thickness of the thinnest portion of said first portion is at least 0.3 mm and not more than 1.5 mm.

34. The golf club according to claim 32, wherein said first portion is located in the range of at least 9 mm and not more than 15 mm in a direction from the peripheral portion of said face toward said back part.

35. The golf club according to claim 32, wherein the length of said

first portion in a direction from a toe toward a heel of said head is at least 10 mm and not more than 80 mm.

36. The golf club according to claim 32, wherein said first portion includes an extension part continuously extending from at least a part of the peripheral portion of said face toward said back part of said head.

37. The golf club according to claim 36, wherein the length of said extension part in a direction from a toe toward a heel of said head is at least 10 mm and not more than 80 mm.

38. The golf club according to claim 37, wherein the central portion of said face and the peripheral portion of said face are formed by different members.

39. A golf club comprising a head of a metal having a face, wherein a flexural range having a spring constant of at least 2 kN/mm and not more than 4 kN/mm is present in the vicinity of a sweet spot of said face.

40. The golf club according to claim 39, wherein the area of said flexural range is at least 75 mm² and not more than 1260 mm².

41. The golf club according to claim 39, wherein the area of said flexural range is at least 75 mm² and not more than 707 mm².

42. The golf club according to claim 39, wherein the area of said flexural range is at least 75 mm² and not more than 314 mm².

43. The golf club according to claim 39, wherein the area of said flexural range is at least 3 % and not more than 50 % of the area of said face.

44. The golf club according to claim 39, wherein the area of said flexural range is at least 5 % and not more than 30 % of the area of said face.

45. The golf club according to claim 39, wherein said spring constant is at least 2 kN/mm and not more than 3.5 kN/mm.

46. The golf club according to claim 39, wherein said spring constant is at least 2 kN/mm and not more than 3.0 kN/mm.

47. The golf club according to claim 39, wherein said flexural range has an elliptic shape, and
inclination of a major axis of said flexural range is in the range of 0° to 40° with respect to the ground.

48. The golf club according to claim 47, wherein said major axis extends toward an upper portion of a toe of said head.

49. The golf club according to claim 47, wherein the aspect ratio of said flexural range is 1 to 4.

50. The golf club according to claim 47, wherein the center of said flexural range is present within 0 to 5 mm from a sweet spot.

5 51. The golf club according to claim 39, wherein said flexural range has a quadrilateral shape.

52. The golf club according to claim 39, wherein said flexural range has a polygonal shape.

10 53. The golf club according to claim 39, wherein said flexural range has a substantially uniform thickness, and the thickness of said face is gradually reduced from the outer periphery of said flexural range toward

the periphery of said face.

5 54. The golf club according to claim 39, wherein the thickness of said flexural range is largest at the central portion and gradually reduced from the central portion toward the periphery of said flexural range while the ratio of reduction of the thickness of said face is increased from the outer periphery of said flexural range toward the periphery of said face beyond the periphery of said flexural range.

10 55. The golf club according to claim 39, wherein the ratio of reduction of the thickness of said face is reduced as the distance between the center of said flexural range and the outer periphery of said face is increased.

15 56. The golf club according to claim 39, wherein the ratio of reduction of the thickness of said face is reduced as the distance between the outer periphery of said flexural range and the outer periphery of said face is increased.

20 57. The golf club according to claim 39, wherein the ratio of reduction of the thickness of said flexural range is reduced as the distance between the center of said flexural range and the outer periphery of said flexural range is increased and the ratio of reduction of the thickness of said face is reduced as the distance between the outer periphery of said flexural range and the outer periphery of said face is increased.

58. The golf club according to claim 39, wherein the region between the outer periphery of said flexural range and the outer periphery of said face is divided into a plurality of peripheral regions,
the thickness of said flexural range is larger than the thicknesses of
5 said peripheral regions, and
the thickness of said peripheral region having a relatively long distance between the outer periphery of said flexural range and the outer

10 periphery of said face is larger than the thickness of said peripheral region having a relatively short distance between the outer periphery of said flexural range and the outer periphery of said face.

59. The golf club according to claim 58, wherein a portion of said face having the maximum height from a sole is located on the side of a toe, and
5 the thickness of said peripheral region located on the side of said toe is larger than the thickness of said peripheral region located on the side of a heel.

60. The golf club according to claim 58, wherein a portion of said face having the maximum height from a sole is located on the side of a heel, and
5 the thickness of said peripheral region located on the side of said heel is larger than the thickness of said peripheral region located on the side of a toe.

61. The golf club according to claim 58, wherein said peripheral regions include first and second peripheral regions, and
said first and second peripheral regions are arranged on and under said flexural range respectively.

62. The golf club according to claim 58, wherein said peripheral regions include first and second peripheral regions,
said flexural range is arranged in the vicinity of a sole, and
5 said first and second peripheral regions are arranged on the side of a toe and on the side of a heel respectively.

63. The golf club according to claim 58, wherein said peripheral regions include first, second and third peripheral regions,
said flexural range extends up to a portion close to a sole, and
said first, second and third peripheral regions are arranged side by

5 side on a toe from the side of a heel.

64. The golf club according to claim 58, wherein said peripheral regions include first, second, third and fourth peripheral regions, and said first, second, third and fourth peripheral regions are arranged to surround said flexural range.

65. The golf club according to claim 39, wherein the region between the outer periphery of said flexural range and the outer periphery of said face is divided into a plurality of peripheral regions,

5 the thickness of said flexural range is larger than the thicknesses of said peripheral regions, and

the thickness of said peripheral region located on the side of a sole is larger than the thickness of said peripheral region located on the side of a crown.

66. The golf club according to claim 65, wherein a portion of said face having the maximum height from said sole is located on the side of a toe, and

5 the thickness of said peripheral region located on the side of said toe is larger than the thickness of said peripheral region located on the side of a heel.

67. The golf club according to claim 65, wherein a portion of said face having the maximum height from said sole is located on the side of a heel, and

5 the thickness of said peripheral region located on the side of said heel is larger than the thickness of said peripheral region located on the side of a toe.

68. The golf club according to claim 65, wherein said peripheral regions include first, second, third and fourth regions, said first and fourth peripheral regions are located on the side of said

sole,

5 said second and third peripheral regions are located on the side of said crown,

10 the length of said first peripheral region between the outer periphery of said flexural range and the outer periphery of said face is larger than the length of said fourth peripheral region between the outer periphery of said flexural range and the outer periphery of said face,

 the thickness of said first peripheral region is larger than the thickness of said fourth peripheral region,

15 the length of said third peripheral region between the outer periphery of said flexural range and the outer periphery of said face is larger than the length of said second peripheral region between the outer periphery of said flexural range and the outer periphery of said face, and

 the thickness of said third peripheral region is larger than the thickness of said second peripheral region.

69. The golf club according to claim 58, including a first tapered part having a thickness reduced toward the outer periphery of said face on the boundary between said flexural range and said peripheral regions, and

5 including a second tapered part having a thickness reduced toward the outer periphery of said face around said peripheral regions.

70. The golf club according to claim 69, wherein the thickness of said flexural range is reduced from the central portion of said flexural range toward the outer periphery of said flexural range.

71. The golf club according to claim 39, wherein the average thickness of a first portion located closer to said face in at least either a crown or a sole of said head is smaller than the average thickness of a second portion located closer to a back part of said head .

72. The golf club according to claim 71, wherein the thickness of the thinnest portion of said first portion is at least 0.3 mm and not more than

1.5 mm.

73. The golf club according to claim 71, wherein said first portion is located in the range of at least 9 mm and not more than 15 mm in a direction from the peripheral portion of said face toward said back part.

74. The golf club according to claim 71, wherein the length of said first portion in a direction from a toe toward a heel of said head is at least 10 mm and not more than 80 mm.

75. The golf club according to claim 71, wherein said first portion includes an extension part continuously extending from at least a part of the peripheral portion of said face toward said back part of said head.

76. The golf club according to claim 75, wherein the length of said extension part in a direction from a toe toward a heel of said head is at least 10 mm and not more than 80 mm.

77. The golf club according to claim 76, wherein the central portion of said face and the peripheral portion of said face are formed by different members.